Biographies
of
Famous Computer Scientists

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Caveat Lector

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The collection has been edited by Simon Read, all errors remain his. To correct errors or suggestion additions of information or individuals please email him as s.read@iee.org.

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The first number in the version indicates major revisions where a large number of biographies are added, or major changes are made to the structure of the document. The second number indicates that a small number of biographies have been added, or that important factual changes have been made. The third number indicates that other kinds of changes, primarily typographical and style corrections, have been made.

Gene Amdahl

16 November 1922 (Flandreau, SD) -

Life and Times

Gene Myron Amdahl spent two years in the Navy during World War II. He graduated from South Dakota State University with a bachelors' degree in engineering physics in 1948, and received a PhD in theoretical physics from University of Wisconsin in 1952. At Univ. of Wisc. he built his first computer, the Wisconsin Integrally Synchronized Computer (WISC). He was hired by IBM, where he was instrumental in the development of the IBM 704 (1956), 709 (1958) and Stretch/7030 (1961). Amdahl left IBM in 1956, but returned in 1960 to become the principal architect of the IBM System/360. System/360 went on to be wildly successful and became a standard in the market at the time. In 1970, he left IBM and founded Amdahl Corporation. Amdahl Corporation was a direct competitor of IBM, providing mainframes that were "plug-compatible" with System/360. Amdahl Corp. machines were smaller, cheaper and faster than the IBM products. Amdahl left Amdahl Corp. in 1980 to found Trilogy Systems Corporation in 1980, and went on to found Andor Systems in 1987. Neither of these companies matched the success of Amdahl Corp.

Professional Contributions

The System/360 series all had the same machine code, but quite different hardware implementations. This simple idea was revolutionary at the time. Amdahl Corp. was the first company to attempt to provide computers compatible with a competitor. This was the forerunner of Cyrix and AMD. Amdahl proposed a rule (known as "Amdahl's Law") which predicts the maximum potential performance improvement that can be expected from a parallel computer.

Amdahl has received the ACM/IEEE Eckert-Mauchly Award (1987) and the IEEE Computer Entrepreneur Award (1989). He has been elected a Fellow of the National Academy of Engineering, a Fellow of the IEEE and a Distinguished Fellow of the British Computer Society (1979).

Biographies

Editorial, "Adventures in the Mainframe Trade," *IEEE Design & Test of Computers*, Vol. 14, No. 2, 1997, pp. 5-13.

J.L. Rodengen and Jon Vanzile, *The Legend of Amdahl*, Write Stuff Enterprises, 2000.

Important Publications

G.M. Amdahl, "The Structure of System/360, Part III: Processing Unit Design Considerations," *IBM Systems J.*, Vol. 3, No. 2, 1964, pp. 144-164.

G.M. Amdahl, G.A. Blaauw, and F.P. Brooks, Jr. "Architecture of the IBM System/360," *IBM J. Research and Development*, Vol. 8, No. 2, 1964, pp. 87-101.

G.M. Amdahl, "Validity of the Single Processor Approach to Achieving Large Scale Computing Capabilities," *Proc. AFIPS Spring Joint Computer Conf.*, 1967, pp. 483-485.

G.M. Amdahl, "Storage and I/O Parameters and System Potential," *Proc. IEEE Computer Group Conf.*, 1970, pp. 371-72.

Kay McNulty Mauchly Antonelli

12 February 1921 (IE) -

Life and Times

Kay McNulty Mauchly Antonelli attended Chestnut Hill College and graduated in 1942. She was in a class of 92 women and three of them were Math Majors like herself. The summer after her graduation she applied for a job and began working with US Army Women's Corps. Her job was to calculate the firing trajectories for artillery in World War II which raging at the time. Kay began working at the Moore School of Engineering at University of Pennsylvania along with 75 women with the same assignment as her. The women working at the school were given the blueprints of the different weapons and were asked to figure out how to aim them. They were also asked to figure out bombing trajectories and basically all the women worked as a giant living computer. The calculations for the different assignments were taking too long so the women taught themselves how to program and they created the Electrical Numerical Integrator and Calculator (ENIAC). They developed the ENIAC in 1946 and it became the first electronic digital computer. In 1948 Kay married John Mauchly. The two had worked together to bring the ENIAC to life.

Professional Contributions

Kay helped create the Electrical Numerical Integrator and Calculator which helped the military in aiming their weapons.

She was one of the first women to start working in the Mathematics field and was a role model to other women who chose to follow her in her footsteps and start working jobs that were originally intended for men.

Biographies

Strauss, Robert. *When Computers Were Born; Technology: They Began Humbly Enough -- The War Department Needed to be Able to Calculate Numbers Quickly. Who Knew the Impact of the Revolution?,* the Times Mirror Company, 1996.

Winegrad, Dilys and Akera, Atsushi. *A Short History of the Second America Revolution,* University of Pennsylvania Almanac, Jan. 30, 1996, Vol. 42, No. 18.

John Vincent Atanasoff

4 October 1903 (Hamilton, NY) – 15 June 1995 (Monrovia, MD)

Life and Times

John Vincent Atanasoff's parents were Ivan Atanasoff (an electrical engineer) and Iva Purdy (a mathematics school teacher). Atanasoff was known to most people throughout his life as "JV". As a young child, Atanasoff was interested in applied mathematics and particularly the computation of mathematical functions. His father bought a Dietzgen slide rule, and Atanasoff was fascinated by use of it and the principles on which it operated (called 'logarithms'). With help from his mother, 9-year-old Atanasoff read J.M. Taylor's "A College Algebra", which taught him how to apply differential calculus and calculate logarithms. Having graduated from high school in 1920, with perfect 'A' grades in all his mathematics and sciences courses, Atanasoff went on to receive a BS in electrical engineering from the University of Florida, Gainesville in 1925, an MS in mathematics from Iowa State College in 1926, and a PhD in theoretical physics from the University of Wisconsin (Madison) in 1930. Atanasoff then returned to teach mathematics and physics at Iowa State College.

Atanasoff has used and built several computing devices in his studies, but wasn't satisfied by their accuracy. In late 1937, after having studied other computing devices such as the IBM tabulator and Monroe, Atanasoff developed ideas for a more accurate computing device. In 1939, he received a grant and started building a computer incorporating these ideas with Clifford Berry. They worked on the machine, dubbed the "Atanasoff-Berry Computer" (ABC) until the outbreak of WWII. Although a patent application for the principles of the machine was started, it was never completed. The machine was electronic and digital (previous electronic computers had been analog) and used rotating drums and capacitors to store values. In May 1967, Honeywell and the Control Data Corporation (CDC) started legal proceedings against Sperry-Rand claiming that their basic patents on technology in Eckert and Mauchly's ENIAC were invalid due to the existence of "prior art" by Atanasoff. On 19 October 1973, Judge Earl R. Larson ruled that "Eckert and Mauchly did not themselves first invent the automatic electronic digital computer, but instead derived that subject matter from one Dr. John Vincent Atanasoff.".

Professional Contributions

As a result of Judge Larson's ruling, Atanasoff is credited with the invention of the digital electronic computer. Atanasoff was awarded the U.S. Navy Distinguished Service Award (1945), the Order of Cyril and Methodius from the Bulgarian Academy of Sciences (1970), Governor's Science Medal (1985), and the Order of Bulgaria (First Class) (1985).

Biographies

A.R. Burks and A.W. Burks, *The first electronic computer: the Atanasoff story*, University of Michigan Press, 1988.

C.R. Mollenhoff, *Atanasoff: Forgotten Father of the Computer*, Iowa State University Press, 1988.

Important Publications

J.V. Atanasoff, "Advent of Electronic Digital Computing," *Annals of the History of Computing*, Vol. 6, No. 3, 1984, pp. 229-282.

Charles Babbage

26 December 1791 (London, UK) – 18 October 1871 (London, UK)

Life and Times

Charles Babbage was born into a wealthy family, and started his mathematics education very early. By . 1811, when he went to Trinity College, Cambridge, he found that he knew more mathematics then his professors. He moved to Peterhouse, Cambridge from where he graduated in 1814. However, rather than come second to his friend Herschel in the final examinations, Babbage decided not to compete for an honors degree. In 1815 he co-founded the Analytical Society dedicated to studying continental reforms of Newton's formulation of "The Calculus". He was one of the founders of the Astronomical Society in 1820. In 1821 Babbage started work on his Difference Engine designed to accurately compile tables. Babbage received government funding to construct an actual machine, but they stopped the funding in 1832 when it became clear that its construction was running well over-budget George Schuetz completed a machine based on the design of the Difference Engine in 1854. On completing the design of the Difference Engine, Babbage started work on the Analytical Engine capable of more general symbolic manipulations. The design of the Analytical Engine was complete in 1856, but a complete machine would not be constructed for over a century. Babbage's interests were wide. It is claimed that he invented cow-catchers for railway engines, the uniform postal rate, a means of recognizing lighthouses. He was also interested in locks and ciphers. He was politically active and wrote many treatises. One of the more famous proposed the banning of street musicians.

Professional Contributions

The Difference Engine was a very early example of a mechanical calculating device constructed to perform a limited range of special purpose calculations. The Analytical Engine, however, could perform arbitrarily complex calculations through the use of punched cards both for storing values and controlling the sequence of operations. It was therefore the first known programmable calculating device and so might be called the first computer.

Biographies

C. Babbage, *Passages from the Life of a Philosopher,* (Longman, 1864; Rutgers University Press, 1994).

A. Hyman, *Charles Babbage: Pioneer of the Computer,* Princeton University Press, 1983.

Important Works

C. Babbage, "Calculating Engines" in *The Exposition of 1851; or Views of the Industry, the Science, and the Government, of England*, John Murray, 1851.

C. Babbage, "On a Method of Expressing by Signs the Action of Machinery", *Philosophical Trans. the Royal Soc.*, Vol. 2, 1826.

John Backus

3 December 1924 (Philadelphia, PA) -

Life and Times

John Warner Backus graduated from Hill School, Pottsville PA in 1942, with by his own admission a less than exemplary record. Backus enrolled at the University of Virginia to become a chemist. While he enjoyed the theoretical side of chemistry, he did not like the required lab work. Soon, his attendance became sporadic and he was expelled in 1943 at the end of his second semester. Backus joined the army , but after an aptitude test was sent to the University of Pittsburgh, PA for pre-engineering studies, and later to Haverford College, PA for a pre-med course. In 1945, Backus started medical studies in New York, but after only nine months. He later claimed, "They don't like thinking in medical school. They memorize - that's all they want you to do. You must not think." Backus then enrolled in a radio technician's school because he liked music and wanted to build himself a hi-fi set. One of Backus' instructors asked him to help do some calculations for an amplifier curve. This task, despite its monotony, got Backus interested in math, and he studied mathematics at Columbia University, graduating with a BS in 1949. During a tour of IBM's Madison Avenue offices, Backus was encourage to take an aptitude test. The director hired him to work with the Selective Sequence Electronic Calculator (SSEC). While working on the SSEC Backus developed Speedcoding, a program to help with writing mathematical programs. Backus developed this idea further heading the team that created FORTRAN, the first high-level programming language. Backus' team released a specification of the language in 1954, but the first production versions of the translator were not available until 1957. Backus developed a notation for describing the complex syntax of Algol based on Noam Chomsky's work. The notation is now known as the Backus Normal Form (BNF).

Professional Contributions

FORTRAN was the first high-level programming language and is still in widespread use. The BNF notation is now used to describe every programming language. The Functional Programming language (FP) Backus describes in the paper he wrote from his Turing Medal lecture is the basis for the new family of functional programming languages. Backus has been awarded the National Medal of Science (1976), the Turing Medal (1977), and the Charles Stark Draper Prize (1996).

Biographies

D. Shasha and C, Lazere, "John Backus" in *Out of Their Minds: The Lives and Discoveries of 15 Great Computer Scientists*, Copernicus, 1995.

Important Publications

J.W. Backus, "The IBM Speedcoding System", *J. ACM*, vol.1, no.1, 1954, pp.4-6.

Specifications for the IBM Mathematical FORmula TRANslating System, FORTRAN, IBM Applied Science Division, 1954.

J.W. Backus, "The Syntax and Semantics of the Proposed International Algebraic Language of Zürich ACM-GAMM Conference", *Proc. Int'l. Conf. Information Processing*, UNESCO, 1959, pp. 125-132.

J.W. Backus, "Can programming be liberated from the von Neumann style? A functional style and its algebra of programs", *Comm. ACM,* vol. 21, no. 8, 1978, pp. 613-641.

Ralph Baer

1922 (DE)

Life and Times

In 1938 Ralph Baer left Germany and headed for the USA. He attended the National Radio Institute and later on graduated as a radio service technician (NRI). Between the years of 1940 and 1943 Baer ran various radio shop services in New York City in which he serviced all several types of home and auto radios and built PA systems.

Baer attended the American Television Institute of Technology in Chicago between the years 1946 and 1949. Once Baer had graduated with a BS degree in Television Engineering, he built television studio equipment while at the American Television Institute of Technology.

Between the years 1945 and 1950 Ralph Baer was Chief and Engineer of a small electronic equipment firm in NYC. In the latter part of his life he Baer worked as a Senior Engineer at Loral Electronics. While working there Baer worked on IBM time punch clock equipment, and developed and analog computer for military radar systems. He also built a complete television receiver.

Professional Contributions

Baer led the development of the first home video game console with the Magnavox Odyssey, which was introduced in 1972. Baer, developed the system in 1966 for the defense-electronics company Sanders Associates in Nashua, New Hampshire (now part of BAE Systems). It was licensed to Magnavox and for a time was Sanders' most profitable line, even though many in the company looked down on game development. Baer also invented Simon, an electronic pattern-matching game that was immensely popular in the late 1970s and 1980s.

Timothy Berners-Lee

8 June 1955 (London, UK) -

Life and Times

Timothy Berners-Lee graduated with a B.A. in physics from the Queen's College at Oxford University in 1976. After graduating, Berners-Lee worked on distributed transaction systems, message relays, and bar-code technology at Plessey Communications Ltd. In 1978, he joined D.G. Nash Ltd., working on typesetting software for intelligent printers and a multi-tasking operating system. In 1980, he spent six months as an independent consultant software engineer at CERN in Geneva, Switzerland. While there, he developed "Enquire" which stored information with arbitrary associations. The program was for personal use and so was never published. In 1984, he returned to CERN on a fellowship working on distributed scientific data acquisition and system control systems. In 1989, he proposed system to allow physicists to share and interlink their information using hypertext based on "Enquire". In the summer of 1991, Berners -Lee publicly released a server ("httpd") and a client ("WorldWideWeb") for the NeXT computer implementing this proposal. The specifications of the protocols used by these programs evolved with input from many users until 1993. The complete system would become known as the World Wide Web. In 1994, he founded the World Wide Web Consortium, hosted by the Laboratory for Computer Science (LCS) at the MIT. The consortium develops specifications, guidelines, software, and tools for the World Wide Web. In 1999, he became the first holder of the 3Com Founders chair at LCS and is now a Senior Research Scientist within the Lab.

Professional Contributions

The World Wide Web is the best known aspect of the Internet, and is based on Berners-Lee's work. Berners-Lee has continued to be influential in the development of the standards used in the World Wide Web.

Biographies

T.J. Berners-Lee and M. Fishcetti, *Weaving the Web*, Harper, 1999.

Important Works

T.J. Berners-Lee, R. Fielding, and H. Frystyk, "Hypertext Transfer Protocol – HTTP/1.0", IETF RFC 1945, May 1996; www.rfc-editor.org/rfc/rfc1945.txt.

T.J. Berners-Lee, *Information Management: A Proposal*, CERN, March 1989 (available as http://www.w3.org/History/1989/proposal.html).

T.J. Berners-Lee, et al, "The World Wide Web", *Comm. ACM*, vol. 37, no. 8, 1994, pp. 76-82.

T.J. Berners-Lee, L. Masinter, and M. McCahill, "Uniform Resource Locators (URL)", IETF RFC 1738, December 1994; www.rfc-editor.org/rfc/rfc1738.txt.

Clifford Berry

19 April 1918 (Gladbrook, IA) – 1963

Clifford Berry's father, Fred Berry, owned an electrical appliance and repair store and it was from his father that Berry started to learn about machines. At the age of 11, Berry's family moved to Marengo, Iowa, where they stayed until Berry was ready to attend college at the Iowa State College. In 1939, Berry received his B.S. in Electrical Engineering. One of Berry's professors, Harold Anderson, was a friend of John Atanasoff, who at the time wanted help working on his computer-machine project. Professor Anderson recommended Berry and so the two began to work together. The machine they were given a grant (from the Iowa State College Research Council) to build was supposed to be capable of solving systems of equations. World War II brought about a stop to the work on the machine. Berry got his M.S. in physics in 1942, and the year after got married to Martha Jean Reed. Berry and Reed went to work for Consolidated Engineering Corporation in Pasadena, and it was there that Berry did research in absentia. He also achieved his Ph.D. in physics in 1948 while still working for the same company. In the following year, Berry was made Chief Physicist of Consolidated Engineering Corporation. He later titles included Assistant Director of Research and Director of Engineering of the Analytical and Control Division. In 1963, Berry changed jobs and became Manager of Advanced Development at the Vacuum Electronics Corporation. He died in 1963, leaving behind 19 patents for mass spectrometry and 11 for vacuum and electronics.

Important Works

Atanasoff, John, Clifford Berry, "Computing Machines for the Solution of Large Systems of Linear Algebraic Equation"

Andrew Booth

1918 -

Life and Times

Andrew Donald Booth's most important work involved the calculations behind x-ray automation. In his calculations Booth was attempting to determine the structure of crystals using X-rays. Though this never evolved into a widely known experiment, his work with x-rays did further his interest in computers. These efforts took place during World War II. The tiresome hours of research and calculating motivated Booth to automate the process. Booth was a part of the British Rubber Producers' Association from 1943-1945. He would later move to Birkbeck College of London to focus on studies while maintaining his ties with the BRPA. The ties he had with the BRPA proved notably beneficial in his work with his Automatic Relay Computer. In 1945 he met with professor Hartree of Birkbeck. Together they dreamed of "general-purpose" automatic computers. At a visit to Princeton two years later, Booth became determined in his creation and design of a program storing computer. Though his resources and staff were limited, Booth continued with his efforts and went through several trial and error stages. At no point in time did he ever have more than one engineering assistant working with him. One key assistant was Ms. Kathleen Britten, who would later become the wife of Andrew Donald Booth. By the end of 1952, he had successfully created an electronic stored-program computer at the Birkbeck lab within the University of London.

Professional Contributions

The A.P.E.(R.)C. built for the British Rayon Research Association. A.P.E.C. stands for All Purpose Electronic Computer. His biggest contribution was with his creation of an algorithm for multiplication. It makes use of a string of the number ones in a binary number to make a short cut. Until a few years ago it was used in almost every computer.

Karlheinz Brandenburg

20 June 1954 (Erlangen, DE) -

Life and Times

Karlheinz Brandenburg got his MSc in electrical engineering and mathematics in 1980 and 1982 respectively. In 1989 he earned his Doctrate in electrical engineering from the Friedrich Alexander University. Between 1989 and 1990 Karlheinz worked for the American company AT&T Bell Labs. But finally return to Germany to continue research on audio coding techniques. His interest was stimulated by the invitation from Prof Dieler Seitzer to join a group research on creating a method of transferring music over a phone line. In 1993 he became the head of Frauhofer Instiute Fegrierte Schaltungen. In July 2004, as the Director of Frauhofer Institute for Media Technology, Karlheinz and his team developed the Losono (3-dimensional audio technology). Karlheinz currently holds 24 different patents.

Professional Contributions

Karlheinz is the the inventor of MP3(Moving Picture[expert GroupLevel]3) Compression technology which now enables high quality music be transferred over the internet.

Important Publications

He is the author of Application of Digital Signal Processing to Audio and Acoustics

Alonzo Church

14 June 1903 (Washington, DC)- 11 Aug. 1995 (Hudson, OH)

Life and Times

Alonzo Church was born June 14, 1903 in Washington, D.C. He attended Princeton University and received a bachelor's degree in 1924, at the age of twenty-one. He received a PhD from the same institution only three years later. He then studied at Harvard for a year, then Göttingen for six months, and then in Amsterdam for half a year as well. Two years after receiving his doctorate, he became a professor of mathematics at Princeton in 1929. In 1936 he published Church's Theorem, describing the existence of the "undecidable problem", or Entscheidungsproblem. He taught at Princeton until 1967 when he became a professor of mathematics and philosophy at California. He died in Hudson, Ohio at the age of 92. At the time of his death, he was widely regarded as the world's greatest logician.

Professional Contributions

Church's PhD Thesis introduced lambda calculus, an important mathematical tool for computer science of today. He is therefore one of the forefathers of theoretical computer science. The lambda calculus was influential in the design of the LISP computer language, in addition to functional language programming in its entirety. His Thesis stated that "effective computation is equivalent to the notion of a 'recursive' function." He also co-created, with Alan Turing, the Church-Turing thesis which states that every complete program can be translated by a Turing machine, and that a Turing machine can translate into any general programming language. Church's lambda calculus also had this function. He also founded the Journal of Symbolic Logic in 1936 and remained an editor until 1979.

Important Works

Church wrote Introduction to Mathematical Logic in 1956. He found the lambda calculus, an equivalent to Turing's Machine in that it can express any computable problem, although it may be very difficult.

James Clark

23 February 1964 (London, GB) -

James Clark was educated at the prestigious boarding school Charterhouse; he moved on to major in mathematics and philosophy at Merton College in Oxford, England where he received Class I Honors.

He started writing open source software in 1987. His first big achievement was the writing of “groff”, “a complete open source implementation of the standard Unix typesetting system”. After completing the system he donated it to the GNU project, and it is now a standard part of Linux.

Since 1991 he has contributed to the completion and widespread use of other important programming feats mainly in SGML/XML including, sgmls, which he made easily available for companies to adopt as a standard. XML is a markup language for documents containing structured information. He is also known for his simplistic straightforward approach to programming. He also was a major investor and director of SoftQuadSoftware until it was sold to the computer software manufacturer Corel.

He now resides in Bangkok, Thailand and owns a small company called Thai Open Source Software Center, “which provides legal framework for his various open source activities.”

John Cocke

30 May 1925 (Charlotte, NC) – July 16, 2002 (Valhalla, NY)

Life and Times

John Cocke's father Norman had always been a large part of John's life, especially considering he was the President of the Duke Power Company and a trustee of Duke University. After receiving his doctorate in mathematics in 1956, Cocke promptly joined I.B.M. and spent his entire career there until finally retiring in 1992. During his time spent at I.B.M., Cocke became the principal designer of the microprocessor used today in larger powerful computers, as well as the Apple Macintosh, which are also known as reduced instruction-set computers (or RISC). Cocke's design was a simplification of hardware, and allowed for faster computation. He also spent much of his time making compilers more efficient, which programmers use to convert their code into computer programs.

Even at a young age, Cocke was always interested in how things work. Even at the age of 6, within hours of receiving his first bicycle, he had already taken it apart and began finding out how it functioned. Cocke had a special attribute which separated him from many others of the time in his field, the understanding of both hardware and software interaction, which allowed him to easily the complexity of computers.

Professional Contributions

Cocke was a significant contributor of the technology of compilers and their efficiency, which enables computers programmed in FORTRAN, C, PASCAL and others to be just as powerful, if not more powerful than computers which are programmed in much more expensive and time consuming ways. RISC allows for computers to run twice as fast other machines using the same number of circuits, which in turn makes computing much cheaper and easier. At the time, RISC was just an unlikely idea that Cocke was determined to make work.

Between the years of 1968 and 1994 Cocke received 19 awards, including in 1972 the I.B.M. Fellow award (the company's highest technical award), in 1991 the National Medal of Technology presented by President George Bush, in 1987 ACM A.M. Turing Award, and in 1994 the National Medal of Science.

Biographies

Lee, J.A.N., IEEE Annals of the History of Computing; Oct-Dec2002, Vol. 24 Issue 4, p53, 3p,

Important Publications

F.E. Allen, and J. Cocke, "A Catalogue of Optimizing Transformations," Courant Computer Science Symp. 5, Prentice Hall, Upper Saddle River, N.J., 1972, pp. 1-30.

Raymond E. Miller, John Cocke: "Configurable computers: a new class of general purpose machines." International Sympoisum on Theoretical Programming,1972: 285-298

John Cocke, Victoria Markstein: "The evolution of RISC technology at IBM." IBM Journal of Research and Development 44(1): 48-55 (2000)

Ted Codd

23 Aug. 1923 (Dorset, GB) – 18 April 2003 (William's Island, FL)

Life and Times

Edgar F. "Ted" Codd attended Undergraduate school at Oxford University and studied mathematics and chemistry. In 1948 he moved to New York to work for IBM. In 1953, he moved to Canada as a result of frustration that no one believed Senator Joseph McCarthy produced proof of his charges that Communists were in the US government. McCarthy made assumptions that spies were in the US Army and failed to prove that it was true. While he was in Canada, he developed a computing center for the Canadian guided missile program. Codd returned to the United States and became a US citizen. In 1965, he earned a doctrine from the University of Michigan in Ann Arbor. In 1981, Codd received a Turing Award. In 1983, Codd's life changed when he suffered a serious injury from a fall. After his recover, he retired from IBM and quit his hobby of recreational flying.

Professional Contributions

Codd created the "relational database model." Hid model made it possible to access large amounts of data from small computers. He contributed understanding in the area of cellular automata. He also created the term OLAP and wrote the twelve laws of online analytical processing.

Biographies

Krieger, Lisa. "IBM Database Developed Dead at 79". *The Mercury News*. (20, April 2003): 1. Oct. 28, 2004.

Important Works

E.F. Codd, E.S. Lowry, E. McDonough, and Casper A. Scalzi *Multiprogramming STRETCH*: *Feasibility Considerations*. Commun. ACM 2(11) 13-17(1959).

Codd, E. F. (1970). A relational model of data for large shared data banks. *Communications of the ACM* **13** (6), 377-387.

John Conway

26 December 1937 (Liverpool, England) -

Life and Times

John Horton Conway attended the Gonville and Caius College Cambridge to earn his bachelor of arts in Mathematics in 1959. At school he was an "avid backgammon player, spending hours playing the game in the common room" which would work into his later fixation on the mathematical theory of games. After graduation, he began research in the field of number theory, under Harold Davenport. In 1964 in earned his doctorate degree, and became the Lecturer in Pure Mathematics at the University of Cambridge. Shortly thereafter, in 1968, he made a mathematical breakthrough regarding the Leech Lattice which served to begin his career as a published writer. By 1970, he had created the *Game of Life*, his most famous invention. Based on the simplification of John von Neumann's ideas, it replicated cellular life and death. It effectively opened up the field of cellular automata for research. Through this discovery, the study of artificial life became possible, and has caused the creation of a number of artificially intelligent systems. These systems represent the 'next generation' of computing, which the *Game of Life* effectively kick-started. Conway then went on to discover surreal numbers and complex game theory, including the theory of Combinatorial Games. In 1983 he was given the position of professor of mathematics at Cambridge. Three years later, he left to hold the John von Neumann Chair of Mathematics at Princeton in the United States. He has since focused his work on geometric patterns, specifically that of crystal lattice symmetries.

Professional Contributions

John Conway is credited with the invention of the *Game of Life* (1970) and the theory of surreal numbers (1970). He has also greatly contributed to "leading research in knot theory, number theory, game theory, quadratic forms, coding theory, and tilings" (O'Connor, Robertson).

Conway has received the Berwick Prize of the London Mathematical Society (1971), the Poly Prize of the London Mathematical Society (1987), the Frederic Esser Nemmers Prize in Mathematics from Northwestern University (1997-98), the Leroy P. Steele Prize for Mathematical Exposition from the American Mathematical Society (2000), and the Joseph Priestly Award by Dickinson College (2001). He has also been elected a fellow of the Royal Society of London (1981).

Biographies

Mark Alpert, "Not Just Fun and Games," *Scientific American* April 1999.

Important Publications

Conway, J. H. *On Numbers and Games*. London, UK: Academic Press, 1976.

Conway, J. H.; Curtis, R. T.; Norton, S. P.; Parker, R. A.; and Wilson, R. A. *Atlas of Finite Groups: Maximal Subgroups and Ordinary Characters for Simple Groups.* Oxford, England: Clarendon Press, 1985.

Conway, J. H. and Guy, R. K. *The Book of Numbers.* New York: Springer-Verlag, 1995.

Conway, J. H. and Sloane, N. J. A. *Sphere Packings, Lattices, and Groups, 2nd ed.* New York: Springer-Verlag, 1993.

Stephen Cook

(Buffalo, NY) -

Life and Times

Stephen A. Cook received his Bachelor's degree in Computer Science from the University of Michigan in 1961. In 1962, he received his Master's degree from Harvard University and later his Ph.D. in 1966. In 1970, he joined the faculty at the University of Toronto, Canada as an Associate Professor. He was promoted to Professor five years later and became University Professor in 1985. Currently, he still works as University Professor in the University of Toronto.

In addition to his having received the Turing Award in 1982, Cook was also awarded a Killiam Research Fellowship Award in that same year. In 1977, he had also received a Steacie Fellowship award-one of Canada's premier science and engineering prizes. Cook is an associate of the Royal Society of Canada, a group of distinguished Canadian scientists and scholars whose primary objective is to promote learning and research in the arts and sciences. He is also a member of the National Academy of Sciences in the U.S. as well as the American Academy of Arts and Sciences.

Professional Contributions

Cook laid the foundations for the theory of “NP completeness”. He proved what is known as “Cook’s theorem”, a proof that the Boolean satisfiability problem is NP-complete. The paper raised important, but yet unanswered, questions on complexity classes.

Important Works

Edward Albert Feigenbaum

20 January 1936 (Weehawken, NJ) -

Life and Times

In 1952, Edward Feigenbaum enrolled in the Carnegie Institute of Technology to study electrical engineering. Feigenbaum eventually earned his PhD in 1959 at Carnegie Institute of Technology and became a faculty member at Berkeley's School of Business Administration. In the early 1960s, Feigenbaum hypothesized that computers could be used to make educated guesses. Due to the fact that Berkeley lacked a Computer Science program, Feigenbaum left Berkeley and went to Stanford to be part of a new artificial intelligence laboratory. In Soon, Feigenbaum and two other associates, Joshua Lederberg, a geneticist, and Carl Djarassi, a chemist, created the first expert system. An expert system is a program that uses available information to suggest solutions to problems within a specific field. They named their expert system DENDRAL and used it to determine the probability of life on other planets. In 1975, Feigenbaum married H. Penny Nii and they would have four children together. From 1976-1981, Feigenbaum served as the chairman of the Stanford University Computer Science Department. During the 1980s, he was involved in the inception of several companies that marketed expert systems technology. From 1994-1997, Feigenbaum served as the Chief Scientist of the U.S. Air Force at the Pentagon. Currently, Feigenbaum is a Professor of Computer Science and Co-Scientific Director of the Knowledge Systems Laboratory at Stanford University.

Professional Contributions

Feigenbaum was elected to the National Academy of Engineering (1986) and to the American Academy of Arts and Sciences (1991). The World Congress of Expert Systems awarded Feigenbaum the first Feigenbaum medal, which was named in his honor. In 1994, he was awarded the ACM Turing Award of the Association for Computing Machinery for his work in designing and constructing the first large-scale artificial intelligence systems.

Important Publications

Feigenbaum Edward A., and Feldman, J., editors, *Computers and Thought*, Mcgraw Hill, 1963.

Feigenbaum Edward A., and McCorduck, Pamela, *The Fifth Generation: Artificial Intelligence and Japan's Computer Challenge to the World*, Addison-Wesley Longman Publishing Co., Inc., 1983.

Feigenbaum Edward A., McCorduck, Pamela, and Nii, H. Penny, *The Rise of the Expert Company*, Times Books, 1988.

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Adele Goldstine

- 1964

Life and Times

Adele Goldstine was wife of Ballistic Research Laboratory (BRL) officer Herman Goldstine. When Officer Goldstine was transferred to the Moore School of Electrical Engineering at the University of Pennsylvania, Adele followed. The Army worked with the Moore School to use the school's differential analyzers, which were forerunners to the modern computer. The differential analyzers were used to calculate ballistic tables for artillery gunners during the war. Adele and other women worked as "computers", and would calculate the tables using the differential analyzers. Women were allowed to work for the Army in this capacity because their computing was seen as clerical work. In 1942, Herman took command of BRL operations at Moore, and appointed three women as his teaching staff, including his wife Adele. Among her other duties, Adele made trips throughout the Northeast, trying to recruit young college-educated women to work for the BRL.

As American involvement in World War II increased, it became evident that the differential analyzers would not be fast enough to meet the rising demand from the field. The BRL decided to create a new computing machine, the Electronic Numerical Integrator and Computer, or ENIAC for short. Adele and many of the other women were assigned to work on ENIAC. Adele trained much of ENIAC's programming staff.

Professional Contributions

When the ENIAC was finally completed in 1945, Adele wrote the only manual that explained how to operate ENIAC. Adele Goldstine made significant contributions to computer science at a time when the field was dominated by men, and women faced discrimination.

Unfortunately, Adele and other women's contributions to the project were largely unmentioned. The women's employment status was "subprofessional", and they received very little credit for the effort they put into ENIAC. Even in Herman Goldstine's book about ENIAC, *The Computer from Pascal to Von Neumann*, their role is largely downplayed. Officer Goldstine merely lists the names of the women who worked on the project, and even misspells one of them. With so little documentation on the women of ENIAC, history may never truly realize or reflect the impact Adele Goldstine and her fellow women workers had on computer science.

Important Publications

Goldstine, Adele. *Manual for the ENIAC.* US Army, 1946.

Richard Hamming

Life and Times

Richard Hamming received his B.S. in 1937 from the University of Chicago, his M.A. in 1939 from the University of Nebraska, and his Ph.D. in mathematics in 1942 from the University of Illinois at Urbana-Champaign.

In 1945 Hamming joined the Manhattan Project, "a U.S. government research project to produce an atomic bomb." At the end of World War II Hamming joined fellow mathematicians Shannon and Tukey. He continued with Bell telephones "until 1976 when he accepted a chair of computer science at the Naval Postgraduate School at Monterey, California."

Hamming also worked for IBM on their early computer, the IBM 650. Some of his major works are Numerical Methods for Scientists and Engineers (1962), Introduction to applied numerical analysis (1971), Digital filters (1977), Coding and information theory (1980), Methods of mathematics applied to calculus, probability, and statistics (1985), Introduction to applied numerical analysis (1989), The Art of Probability for Scientists and Engineers (1991) and The Art of Doing Science and Engineering : Learning to Learn (1997).

Hamming also received many awards for his work in computer science, some of which include being made fellow on the Institute of Electrical and electronics Engineers in 1968, winning the Turing Prize from the Association for Computing Machinery also in 1968, and the Institute of Electrical and Electronics Engineers awarded him the Emanuel R Piore Award in 1979. Hamming also won a medal in 1988 for "exceptional contributions to information sciences and systems, which has now been named "the Hamming Medal" in his honor.

Professional Contributions

There Hamming was best known for his work on "error-detecting and error-correcting codes." This is a collection of methods to detect errors in transmitted or stored data and to fix them. The easiest form of error detection is an added parity bit or a cyclic redundancy check. Parity bits can also tell if bits have been inverted, and should therefore be re-inverted to restore the original data. The more extra bits are added, there is a greater chance that multiple errors will be detected and corrected. He wrote a very important paper on the topic in 1950 which started a completely new subject in information theory. "Hamming codes are of fundamental importance in coding theory and are of practical use in computer design."

Hamming's research in codes related to packing problems and error-correction led to the "solution of a packing problem for matrices over finite fields."

In 1956 Hamming worked on an early computer by IBM. His work on the IBM 650 allowed him to develop a programming language which has "evolved into the high-level computer languages used to program computers today. Other work Hamming contributed in was advances in numerical analysis, integrated differential equations, and the Hamming spectral window "which is much used in computation for smoothing data before Fourier analyzing it.

Biographies

S P Morgan, Richard Wesley Hamming (1915-1998), Notices of the American Mathematical Society 45 (8) (1998), 972-977.

David Harel

(Leeds, GB) -

Life and Times

When David Harel was seven years old, he immigrated to Israel, where, he attended the Mativ Meir yeshiva in Jerusalem. As an Israeli citizen, he had to serve in the military. When that was finished, he continued on to Bar-Ilan University, where he received a BSc in computer science and mathematics in 1974. By 1976 Dr. Harel obtained his MSc from Tel-Aviv University. After Dr. Harel completed his PhD at MIT in 1978, he spent two years at IBM's Yorktown Heights research center, and taken sabbatical years both at Carnegie-Mellon and Cornell Universities. Since 1980, Professor Harel has been the Dean of Faculty of Mathematics and Computer Science at the Weizmann Institute of Science in Israel. Besides that, he has spent shorter and more varying amounts of time at the following institutions: IBM, Lucent Technologies Bell Labs, DEC, NASA, University of Birmingham, Verimag, the National University of Singapore, and the Open University of Israel (1991-1999). He has been the recipient of many awards, recently including the Israel Prize, the most prestigious award the State of Israel presents.

Professional Contributions

During a sabbatical from the Weizmann institute, David Harel co-founded I-Logix in 1987. I-Logix is one of the leaders "in [the] embedded systems and software solutions market". He is the creator and inventor of the language of Statecharts. He also was one of the collaborators who worked together to create Live Sequence Charts, and also contributed to the creation of the tools Statemate, Rhapsody, and the Play-Engine. Prof. Harel's contributions to computer science have been crucial to the behavioral aspects of the UML. Although most of his fields of research are very complex, some of Prof. Harel's writings are composed for a general audience. Prof. Harel does a specifically excellent job of explaining his theories and findings to students of computer science. An example of this is his algorithmics book.

Important Works

David Harel, *Computers Ltd: What They Really Can't Do.* London: Oxford University Press, 2000.

David Harel, *Algorithmics: The Spirit of Computing,* Addison-Wesley, 1987.

David Harel, *Modeling Reactive Systems with Statecharts: The Statemate Approach.* McGraw-Hill Companies 1998.

Harel, *First-Order Dynamic Logic, Lecture Notes in Computer Science*, Vol. 68, Springer-Verlag, New York (133 pp.), 1979.

A. K. Chandra and D. Harel, "Computable Queries for Relational Data Bases", *J. Comput. System Sciences* 21 (1980), 156-178. (Also, *Proc. ACM 11th Symp. on Theory of Computing*, pp. 309-318, Atlanta, Georgia, April 1979.)

John Hopcroft

7 October 1939 -

Life and Times

John Hopcroft earned his bachelor's degree from Seattle University in 1961. He then earned his Master's Degree in 1962, followed by his Ph.D. in 1964. Both advanced degrees were issued by Stanford University and were in the field of Electrical Engineering. After this he spent three years teaching at Princeton University, but then moved to Ithaca to do research at Cornell University. At Cornell he has moved from professor, eventually serving as the Joseph Silas Dean of Engineering from 1994-2001. He is currently a research professor at Cornell.

Hopcroft was appointed to the National Science Board in 1992, and served on the National Research Council's Commission on Physical Sciences, Mathematics, and Applications from 1995-1998. He was awarded the ACM Turing Medal in 1986 (with Robert Tarjan), and Doctor of the Humanities Degree, Honoris Causa, from Seattle University in 1990.

Professional Contributions

Hopcroft has made much advancement in the fields of data structures, algorithms, and automata theory. He has coauthored four books. He continues his research today in the field of graph algorithms.

Important Publications

J.E. Hopcroft, Rajeev Motwani, Jeffrey D.Ullman, "Introduction to Automata Theory, Languages, and Computation" Second Edition. Addison-Wesley, (2001).

Alfred V. Aho, J.E. Hopcroft, Jeffrey D.Ullman, "The Design and Analysis of Computer Algorithms." Addison-Wesley Series in Computer Science and Information Processing, (1979).

John Hopfield

15 July 1933 (Chicago, IL) -

Life and Times

John Hopfield earned his BA from Swarthmore College in 1954, and went on to earn his PhD in physics from Cornell University in 1958. He received an honorary DSc from Swarthmore in 1992. Hopfield started his career in technology as part of the MemTech staff at the ATT Bell Labs in New Jersey from 1968-70, and again from 1973-90. His first position at Princeton was as a professor from 1964-80, and again from 1997 to the present. At Princeton he was a professor of molecular biology. Hopfield has also been a Professor of Chemistry and Biology at The California Institute of Technology.

John Hopfield has won numerous awards including: MacArthur Fellow, 1983-88; Pudley Wright Prize, 1989; California Scientist of the Year, 1991; Neural Net Pioneer Award IEEE, 1997; Helmhotz Award, International Neural Network Society, 1999; Pirae(spelling) Medal, International Center for Theoretical Physics, 2000. He is a member of the: National Academy of Science; American Academy of Arts and Science.

Professional Contributions

John Hopfield published a paper in 1982 entitled "Neural Networks and Physical Systems with Emergent Collective Computational Abilities". A neural network is a method of solving a problem based on how the neurons in a brain work. The artificial network can store patterns, and even if some of the connections (synapses) are broken, can still recover the pattern. This is called a connectionist method of solving problems. Neural networks are extremely useful in pattern recognition, function approximation, classification, and time series prediction. Hopfield continues his research currently in working with how the brain develops such powerful computations with its neural circuits based on olfactory sense.

Important Publications

John Hopfield, "Neural Networks and Physical Systems with Emergent Collective Computational Abilities" . Produced in the National Academy of Science, USA. Vol. 79, pp 2554-2558, April 1982. Biophysics.

John J. Hopfield and David W. Tank, an article entitled Neural Computation of Decisions in Optimization Problems, appearing volume 52 of the journal Biological Cybernetics in 1985, page 141-152.

Tom Kilburn

11 August 1921 (Dewsbury, GB) – 2001 (Manchester, GB)

Life and Times

Tom Kilburn attended Cambridge University to studied Mathematics and in 1942 he graduated first in his class. After graduating he attended a City and Guilds crash course in electricity, magnetism and electronics in London, and reported to work for the Telecommunications Research Establishment in Malvern where he was assigned to the Freddie Williams group. The Freddie Williams group was a think tank and problem solving group for radar and electronics. In 1946 Tom Kilburn followed Freddie Williams, of the Freddie Williams group, to the University of Manchester where is continued his work on the digital storage of information on Cathode Ray Tubes (CRT).

In 1947 Freddie Williams and Tom Kilburn were successful in storing 2048 bits on a CRT and were now attempting to build the first small computer around this storage device. In 1948 Kilburn led the work on designing a building a Small Scale Experimental Machine called "the baby." The Baby was the world's first computer that could hold any user program in electronic storage and process it a electronic speeds. And in 1948 he wrote the first program for it as well.

In 1948 Kilburn joined the staff of the Electrical Engineering department and was awarded a Ph.D for his work on the CRT and the Baby. Later on in 1948 Williams and Kilburn started work on the basic design of the Manchester Mark 1 and one year later the turn over to Ferranti Ltd, the company contracted to build the computer by the government.

In 1956 Tom Kilburn and his team started to look at the design of a machine that would be far larger and, with transistors and core store now available, much faster. It was called MUSE (for microSEcond) and aimed for a speed of 1 million instructions a second. This was 1,000 times faster than the Mark 1 still running the computer service. The innovation required to *achieve* this speed, and then to deal effectively with the *implications* of it, was massive.

Tom Kilburn's next project was to set up a new department. He had been made a Professor of Computer Engineering (in the Electrical Engineering department) in 1960, and in 1964 the Computer Group evolved into the new Department of Computer Science, with Tom Kilburn as its head, now Professor of Computer Science, with a complement of 12 academic staff.

Tom Kilburn retired in 1981, handed over his position to Professor D.B.G. Edwards. His final honor was to be made a Fellow by the Computer Museum History Center and his last professional act was in November 2000, the week before going into hospital, to record an acceptance speech in front of the working replica of the Baby at the Museum of Science and Industry in Manchester.

Awards and Honors

Tom Kilburn has received a large number of honors and awards over the years, for example

1965 Fellow of the Royal Society

1973 C.B.E.

1976 FEng, founder member of the Fellowship of Engineering

1978 Royal Medal of the Royal Society

1982 Computer Pioneer Award, IEEE Computer Society

1983 Eckert-Mauchly Award, ACM & IEEE Computer Society

Jack Kilby

8 November 1923 (Great Bend, KS) –

Life and Times

Jack St. Clair Kilby grew up in Great Bend, Kansas and began his career in 1947 after earning a B.S at the University of Illinois and a M.S. at the University of Wisconsin. Both of these degrees were in electrical engineering. His first job involved the development of ceramic-base, silk-screen circuits for consumer electronic products at the Centralab Division of Globe Union Inc. in Milwaukee. Later in 1958, he began working at Texas Instruments in Dallas, Texas. In 1970 he took a leave of absence of from TI and worked as an independent inventor. During this time he was also the Distinguished Professor of Electrical Engineering at Texas A&M University from 1978 to 1984. Mr. Kilby retired from TI in the 1980's but still consults.

Kilby has been awarded the National Medal of Science in 1970 and was inducted into the Inventors Hall of Fame in 1984. In 2000 he was awarded the Nobel Prize in Physics.

Professional Contributions

The demonstration of a simple microchip on September 12, 1958 changed the world. Jack Kilby used germanium as his material of choice for the construction of the chip. Mr. Kilby was awarded a patent for miniature electronic circuits. At the same time Inventor Robert Noyce, a co-founder of Intel, developed an IC using silicon and was awarded a patent for silicon based IC. These conflicting patents caused many legal battles between TI and Intel.

Jack Kilby, along with James Van Tassel and Jerry Merryman, invented the pocket calculator at Texas Instruments and were awarded a patent for their work.

Mr. Kilby also invented the process of thermal printing in which a printer's head burns an image onto heat sensitive paper. Expanding on the idea of pocket printers he invented a paging system that allowed a message to be broadcast and only the intended recipient printer would print the message.

Biographies

Cortada, James W. 1987. Historical Dictionary of Data Processing: Biographies, Greenwood Press, Westport CT.

Slater, Robert. 1987. Portraits in Silicon, MIT Press, Cambridge MA.

Important Publications

Kilby, Jack S., "Turning Potential into Realities: The Invention of the Integrated Circuit",

Patent #3,138,743 for miniature electronic circuits

Patent #3,819,921 for the pocket calculator

Patent #3,944,724 for a Paging system with selectively actuable pocket printers

Donald Knuth

Donald Knuth was a man who didn't know exactly what he wanted to do with his life, even when he was in high school. Although we all know that in some way or another, Knuth is indeed involved in the Computer Science world, he had many different ideas along the way when he was growing up. Oftentimes the great minds of the world aren't put to the subject they are most well known for until later in life, as was the case for Knuth.

When in high school, he was very interested in composing and playing music and was planning on studying music after he graduated from high school. Knuth played the saxophone and later played the tuba in his school band, and it seemed like he would really go through with this whole idea of music. Although he was very into his music, he didn't lose focus on any other part of his schoolwork, and achieved the highest grade point average that anyone had ever achieved at his school. He had started to become interested in mathematics toward the end of his high school career, working with different dimensions to amuse himself. He was even very undecided about what it was that he really wanted to do when he was offered a scholarship to Case Institute of Technology in Cleveland, Ohio. He had decided to study physics at this juncture and to pass on the whole idea of musical education. Even after he had decided to move on to physics, he again started to lean toward a different subject, and this time it was mathematics. As Knuth eased into mathematics, he also started to learn that he had a gift for the Computer Science world. He first found this out for himself when he read a manual for an IBM machine, and figured that he could write a much better program for the machine than had already been done, he noticed this gift almost immediately.

As Knuth gained more experience at this programming, he eventually designed a program which analyzed the performance of the basketball at his school in 1958. By 1962, he had a good base of knowledge set for him to be able to do more big-time programs and such. That year, Addison-Wesley asked him to write a text on compilers, which he also started that year. Knuth is very well known for his multi-volume book: The Art of Computer Programming. This book is one of the most highly respected references for programming in the world of computers to this day. He helped develop many of the "rigorous" algorithms that are used nowadays and helped to establish a base in programming solutions. Knuth is also reponsible for the TeX typesetting system and the Metafont font design system, both of which he happened to stumble upon when working towards other goals in the computer world.

Robert Kowalski

15 May 1941 (Bridgeport, CT) –

Life and Times

Robert Kowalski was born to polish parents and attended a Catholic Primary School. Afterwards he attended a Jesuit boys-only school. Here he was placed on a team which translated previously unseen Latin text into English. He was the top student on the team and the team took first prize in New England. He also began to read philosophy books outside of school, and this fueled his desire to discover what the single truth was in life. He spent his first year of college at the University of Chicago and got A's in all of his classes, with the exception of English writing skills, in which he did rather poorly. November of his second year he left the University of Chicago because of the ridiculous curriculum. The rest of the year he worked as a quality control inspector in a chemical factory in addition to trying to find himself. The following year he enrolled himself in the University of Bridgeport. In order to attain a scholarship, he created a club for people who didn't want to be in clubs. In his out of school time, Kowalski independently studied, mostly concentrating on Logic. For Graduate school, Kowalski attended Stanford to study Mathematics, though his real interest was still Logic. He enrolled in an exchange program to study Mathematical Logic at the University of Warsaw. There he also met his future wife, Danusia. He left Stanford halfway through his next academic year, but had already taken enough classes to attain a masters degree. He worked as an assistant professor in Puerto Rico for a year but then decided he needed a PhD if he wanted to be taken seriously in the academic world.

After applying for various fellowships, Kowalski finally was accepted by the head of the Meta-mathematics Unit at the University of Edinburgh. Finally, after 2 years, he attained a PhD. In 1972, along with Alain Colmerauer, he established Logic programming as it is understood today. In the late 1970's Kowalski taught at Imperial College in London, focusing his teaching on logic, logic programming, and artificial intelligence. He also wrote his first book, "Logic for Problem Solving". He eventually moved up in the ranks and became head of his department at the College. During his life he also did much work involving conflict resolution.

Professional Contributions

Robert Kowalski's most important contribution is developing Logic programming as we know it today.

Important Publications

R. Kowalski. A Logic-based Model for Conflict Resolution. April 2003.

R. Kowalski. Logic for Problem Solving. 1979. North Holland.

Thomas Kurtz

1928 -

Life and Times

In 1951, Thomas E. Kurtz's first experience with computing came at the Summer Session of the Institute for Numerical Analysis at UCLA. Thomas E. Kurtz received his Ph. D. in 1956 from Princeton. Dr. Kurtz became a teacher in the Mathematics Department of Dartmouth College in 1956. 1962, Dr. Kurtz and, at the time the Chairman of the Mathematics Department, Dr. John G. Kemeny, developed and designed a time-sharing system for university use. In 1964, the zenith of the two doctors' hard work resulted in the development of the first Dartmouth Time-Sharing System and the computer language BASIC. Dr. Kurtz held man different jobs besides teaching. From 1966-1975, he served as Director of the Kiewit Computation Center. From 1975-1978, he was Director of the Office of Academic Computing. Dr. Kurtz retuned to teaching full-time as a Professor of Mathematics, while concentrating on statistics and computer science. Dr. Kurtz has had other jobs away from Dartmouth College. He was Council Chairman and Trustee of EDUCOM, as well as Trustee and Chairman of NERComP, and on the Pierce Panel of the President's Scientific Advisory Committee. Dr. Kurtz also served on the steering committees for the CONDUIT project and the CCUC conferences on instructional computing. He has served as Principal Investigator of six NSF or ARPA promoted projects dealing with computing and the instructional use of computing.

Professional Contributions

Along with Dr. John G. Kemeny, Dr. Kurtz created the computer Language BASIC, in 1964 at Dartmouth College. BASIC, also known as Beginner's All Purpose Symbolic Instruction Code, was set up for the G.E.225 to be a very simple language to learn from and be easy to translate. Dr. Kurtz and Dr. Kemeny, wanted BASIC to help students learn the more powerful compute languages such as FORTRAN or ALGOL. In 1983, both doctors developed True BASIC which implemented and showed all the advancements that were added to their language.

Important Works

Thomas E. Kurtz co-authored the book ***BASIC***

Thomas E. Kurtz wrote the document *Index of Creative Computing articles*, *Creative Computing Vol. 10 No. 11 - November 1984* also know as *BASIC is Back*

Victor Lawrence

Life and Times

Victor B. Lawrence graduated from the University of London in the United Kingdom. There, he received his undergraduate, masters, and doctorate degrees. Dr. Lawrence taught at Kumasi University of Science and Technology in Ghana until 1974 when he joined Bell Labs. At Bell Labs, he was the Director of Advanced Multimedia. He was responsible for systems engineering, exploratory development of multimedia signal processing, transmissions, and switching. In 1981 he recieved the Gullemni-Cauer Prize Award from the IEEE Circuits and Systems Society. He was Special Rapporteur on Coding from 1982 – 1984. In 1994, he received the Emmy Award for HDTV Grand Alliance Standard. Dr. Lawrence has co-authored several books including: "Introduction to Digital Filters," "Intelligent Broadband Multimedia Networks," "Tutorials on Modern Communication," and "Design and Engineering of Intelligent Communications Systems."

Professional Contributions

Victor Lawrence played a large role in the development of gigabit, photonic, and wireless networking with high-performance high speed VLSI and embedded software, and vertical services. Dr. Lawrence holds over 20 US and international patents and over 45 papers in reference journals and conference proceedings on the topics of digital signal processing and data communications. Amongst the patents he holds are the space area network, the object area network, digital filters with control of limit cycles, coding for digital transmission, and multidimensional channel coding. He has also contributed to organization of localized and independent intelligent medical networks.

Important Works

Ahamed, Syed V. and Lawrence, Victor B., "Intelligent Broadband Multimedia Networks", Kluwer Academic Publishers, 1997.

Ahamed, Syed V. and Lawrence, Victor B., "Design and Engineering of Intelligent Communications Systems", Kluwer Academic Publishers, 1997.

Ahamed, Syed V. and Lawrence, Victor B., "The Art of Scientific Innovation", Pearson International, 2004.

Lawrence, Victor B., "IEEE Communications Societies Tutorial in Modern Communications", Computer Science Press.1983.

Ahamed, Syed V. and Lawrence, Victor B., "Localized Knowledge Based Intelligent Medical Networks", 16th IEEE Symposium on Computer-Based Medical Systems, 2003.

Ada Lovelace

10 December 1815 (London, England) – 27 November 1852 (London, England)

Life and Times

Augusta Ada Byron was the daughter of Lord George Byron, the poet, and Anne Milbanke. While she was still an infant her parents separated and she remained in her mother's care. Ada's mother focused her education on mathematics, punishing her when she showed greater interest in geography and art, and selecting tutors for her on their ability to teach her mathematics. Ada had a series of health problems during her childhood. Ada was presented at court in 1833; there her friend Mary Somerville introduced her to Charles Babbage. She loved the "universality of his ideas" and from that moment on their work together started.

In July of 1835, she married William King. In the following years, she had three children: Byron in 1836, Annabella in 1837 and Ralph Gordon in 1839. William and Ada became the Earl and Countess of Lovelace on June 30, 1838. In 1842, however, she resumed advanced studies of mathematics with the release of L.F. Menabrea's description of the analytical engine.

Ada Lovelace died of cancer, at the age of 36, in 1852. She was buried beside the father she never knew.

Professional Contributions

When Ada Lovelace read the ideas of Charles Babbage, she became inspired. She wrote notes on how it could be expanded, which turned out to be three times the size of the original thought. She was a very focused mathematical taskmaster, and loved what she did. The woman that is considered to be "the first programmer" wrote a plan to Babbage on how the engine could be able to calculate Bernoulli numbers. This plan is considered to be the first "computer program."

She has been honored by the naming of a programming language, Ada, after her by the United States Department of Defense in 1979. By 1984, Ada become a trademark for the Department of Defense and is still used today.

Biographies

Dorothy Stein. *Ada: A Life and A Legacy*. (Cambridge, MA: MIT Press, 1985)

Important Publications

Lovelace's Notes were published in Richard Taylor's Scientific Memoirs Volume 3 in 1843 with the author's name given as AAL.

Pattie Maes

Life and Times

Patties Maes is currently a Associate Professor in MIT's program of Media Arts and Sciences. She works mainly in the areas of artificial intelligence, artificial life, and human-computer interaction. Maes is a student of Rodney Brooks and has been a longtime researcher of artificial intelligence. She is a part of a new "school" of artificial intelligence that replaces biological structures with the rules of logic, in order to develop intelligent machines. She holds a Sony Corporation Career Development Chair and she was previously a visiting professor and Research Scientist for MITs Artificial Intelligence Laboratory. Mae earned a doctorate in Computer Science from the Vrije Universiteit Brussel in Belgium in 1987 with the greatest distinction, and she also received a bachelor's in Computer Science from the same institute in 1983 with great distinction. Maes interests for the future include building autonomous agents that interact with people.

In 1984, Pattie Maes won IBM's Best Bachelor's Thesis Award and she wont the 1995 Arts Electronica award. She was one of Newsweek's “100 Americans to Watch For” and a part of TIME's Digital Cyber Elite. In addition, Massachusetts Interactive Media Council awarded her a “Lifetime Achievement Award.”

Contributions

At MIT she founded and currently runs the Autonomous Agents Group, and at MIT's Artificial Intelligence Laboratory she founded and directed the Software Agents Group. This dealt with semi-intelligent computer programs that assist the user with information overload and internet complexity. She organized the first major symposium at MIT on interface agents in October 1992. She is a project leader for the Artificial Life Interactive Video Environment (ALIVE project), which is a program that allows humans to interact with 3D animated autonomous characters. Another distinction that Maes has is being the founder of Agents, Incorporated in Boston, Massachusetts which is one of the first companies to commercialize software agent technology.

Important Publications

R. Brooks and P. Maes, editors. Artificial Life IV: Proceedings of the Fourth International Workshop on the Synthesis and Simulation of Living Systems. MIT Press, July 1994.

P. Maes, editor. Designing Autonomous Agents: Theory and Practice from Biology to Engineering and Back. MIT Press, March 1991.

P. Maes and D. Nardi, editors. Meta-Level Architecture and Reflection. North-Holland, February 1988.

Robert Metcalfe

1946 (Brooklyn, NY) –

Life and Times

Robert Metcalfe graduated second in his class from Bay Shore High School, he ended up at MIT where he earned degrees in electrical engineering and business management. During his time there he worked a series of jobs to help pay his expenses and was also the captain of the varsity tennis team. After graduating from MIT he then earned a master's degree in applied mathematics from Harvard and later a doctorate in computer science. Harvard refused to let him be responsible for connecting the school to the brand-new ARPANET, so Metcalfe took a job at MIT building the hardware that would link MIT to the ARPANET. Metcalfe was excited about the ARPANET and decided to make it the topic of his doctoral dissertation. Metcalfe, having already accepted a job with Xerox, was shocked and angry when Harvard had flunked him claiming that his dissertation was "not theoretical enough". He was told to come take his job anyway and finish his doctoral work later. His ideas for his new dissertation came when he read a paper about the ALOHA Network from the university of Hawaii that used radio waves instead of telephone wire to transmit data. Metcalfe saw several problems in the design so he reworked it and made it the topic of his new dissertation. Metcalfe's new dissertation was accepted he finally got his Ph.D. Back at Xerox he was then responsible for creating the new technology, called Ethernet, which connected personal computers using his modified version of Alohanet that used cables instead of radio waves to send and receive data. In 1979, he started his own company, called 3Com, where he continued to push Ethernet to the new standard for local area connections.

Professional Contributions

Universities began using Ethernet to connect many different workstations which were then connected to the Internet. As a result, Ethernet helped lead to the expansion of the Internet. Metcalfe is also proud of Metcalfe's Law, which states that the usefulness, or utility, of a network equals the square of the number of users, and therefore convinced the world to adopt his Ethernet standard.

Biographies

Kirsner, S.(1998). "The Legend of Bob Metcalfe." *Wired*, Nov. 1998.

Hafner, K. & Lyon, M. (1996). Where Wizards Stay Up Late: The Origins of the Internet. New York: Simon & Schuster.

Blaise Pascal

19 June 1623 (Clermont, FR) – 19 August 1662

Life and Times

Blaise Pascal's curiosity in mathematics began when his father forbid him to study math until he was 15. Because of his heightened curiosity at the forbidden fruit, he started studying geometry at the age of 12. At this young age, he discovered that the sum of the angles of a triangle are 2 right angles (180 degrees.) When his father found out about his sons discovery, he finally gave in and supported his son's interest in mathematics. Starting at the age of 14, Blaise Pascal frequently accompanied his father to Mersenne's meetings, where he met many mathematicians that sparked his interests even further. This early exposure to mathematics led to a lifetime of accomplishments for Blaise Pascal.

Professional Contributions

In his lifetime, Pascal made a number of important mathematical discoveries. His claim to fame in the computer science department is that he invented the world's first digital calculator, to help his father with his work, which involved collecting taxes. He worked on this device from 1642 to 1645, and called it the Pascaline. The Pascaline actually resembled a mechanical calculator of the 1940s.

Pascal's other significant accomplishments in many mathematical fields include: the mystic hexagon (1639), Essay on Conic Sections (1640), New Experiments Concerning Vacuums (1647), Treatise on the Equilibrium of Liquids (1653), and The Generation of Conic Sections (1648).

Alan Perlis

1 April 1922 (Pittsburg, PA) – 7 February 1990 (New Haven, CT)

Life and Times

Alan J. Perlis received his Bachelor's Degree in Chemistry from the Carnegie Institute of Technology. Alan J. Perlis then served for three years in the US Army Air Force during World War II, where his interest in mathematics developed. In 1949 he received his master's degree in mathematics at MIT, as well as his PhD in mathematics in 1950. He was the first head of the Computer Science Department at Carnegie-Mellon University, which he helped to establish.

Alan J. Perlis helped establish the Association for Computing Machinery (ACM) and served as its president from 1962 to 1964. He served as the founding editor of the Communications of the ACM (CACM). Alan J. Perlis became the first recipient of the Turing Award in 1966.

Professional Contributions

Alan J. Perlis made many important contributions to early computer science. He helped develop early algebraic languages as well as the language ALGOL-60. In particular this referred to his contributions to the development of ALGOL-60. In 1982 he wrote Epigrams in Programming for ACM's SIGPLAN journal, explaining much of what he learned throughout his career.

Important Works

Jon Postel

3 August 1943 (Altadena, CA) – 16 October 1998 (Santa Monica, CA)

Life and Times

Jonathan Bruce "Jon" Postel attended the University of California, Los Angeles (UCLA), where he earned a B.S. and M.S. degrees in Engineering. In 1974, he earned his PhD. in Computer Science, also from UCLA. As a graduate student at UCLA, Jon worked on many projects including the beginnings of the Advanced Research Projects Agency Network (ARPANET). ARPANET was a U.S. Department of Defense project that laid the groundwork for the Internet. At UCLA, he would also work on the development of the Network Measurement Center. In 1977, Jon left UCLA to work at The University of Southern California's (USC)Information Sciences Institute, where he spent the rest of his career.

Professional Contributions

Although he can not claim sole responsibility to any one innovation, Jon Postel played a part in the development of several vital Internet protocols. These include TCP/IP, which is the basic protocol for the Internet, SMTP, which is the standard for e-mail transfer, and DNS, which are the servers that store the location of all websites.

Jon also served as the Internet Assigned Numbers Authority (IANA), which is both an organization and a position. Among other things, he was responsible for setting and maintaining the standards for IP address and port distribution. During this time, Jon also co-authored over two hundred Request for Comments (RFC) documents, and was an editor for hundreds more. In fact he was and editor for the series from its inception in 1969 until his death. RFCs are technical and organizational documents about various aspects of the Internet, from protocols to concepts.

Biographies

http://www.postel.org/postel.html#about Jon Postel

http://www.domainhandbook.com/postel.html In Memoriam

Important Publications

See the RFC Database at http://www.rfc-editor.org/rfc.htm

Raj Reddy

1937 (IN) –

Life and Times

Dr. Raj Reddy hails from India where he was a member of the Indian Air Force ROTC. Dr. Reddy received a BE degree from the Guindy Engineering College of the University of Madras, India in 1958 and a MTech degree from the University of New South Wales, Australia, in 1960. He received a Ph.D. degree in Computer Science from Stanford University in 1966. In, 1960 Reddy began his computer science work with IBM as an applied science representative which soon after he started his career in academics. Beginning his academic career in 1966 at Stanford University he soon moved to Carnegie Mellon University as an Associate professor. In 1973 he became a full professor and in nine years would become a University Professor. In 1992 he was named the Herbert A. Simon University Professor of Computer Science and Robotics in the School of Computer Science at Carnegie Mellon University. From 1979 to 1991 he served as the founding director of the Robotics institute followed by Dean of School of Computer Science until 1999.

Professional Contributions

Reddy is known for his work in the field of human computer interaction and artificial intelligence. He has also been involved with the making of online digital book libraries such as the million book library, and projects in spoken languages, computing, learning, and networks.

He has been awarded Legion of Honor by President Mitterand of France in 1984, the ACM Turing Award in 1994, and is a member co-chair of the President's Advisory Committee on Information Technology

Important Publications

Reddy, Raj, ed. Speech Recognition: Invited papers presented at the 1974 IEEE Symposium. New York: Academic Press, 1975.

Lawrence Roberts

Life and Times

Dr. Lawrence G. Roberts has made and is still making many contributions to the network we know today to be the internet. Dr. Roberts began to his packet network in 1965 when he was a MIT. From here, after much coaxing by Bob Taylor, Dr. Roberts moved, in 1966, to ARPA and made a network that used a dial up connection to connect computers in ARPA and around the world. ARPA was skeptical at first but when they realized the advantage of being connected this way, sharing research, working together on papers, and etc., they quickly became believers. Roberts made the ARPANET work by having one computer act as the host for small computers called IMP's (Interface Message Processor). The first two IMPs were sent to UCLA an SRI, when the two were connect the internet was created. By 1973 Roberts had connected 23 computers worldwide. After leaving APRA, Roberts went to start the first packet data communication carrier called Telenet. Soon Roberts began to work on the concept of Asynchronous Transfer Mode, or ATM. This is basically an evolved packet system. Now with ATM you could transfer more things especially multimedia at extremely fast speeds. The ATM technology is making its way in to homes and business everywhere and is soon will replace the old method.

Professional Contributions

Dr. Lawrence Roberts was instrumental in developing the internet in to a packet switched format compared to the switch board communication that was common at the time. Roberts did this by helping construct IMPs. He also helped make ATM technology which is now the new way to transfer information especially multimedia.

Important Works

The ARPA Network By L. G. Roberts, Advanced Research Projects Agency, Washington, D.C. and Barry D. Wessler University of Utah, May 1971

"ARPA Network Implications" EDUCOM, Vol. 6, No. 3, pp. 5-8, Fall 1971

"A Forward Look" Signal, Vol. XXV, No. 12, pp. 77-81, August 1971.

Adi Shamir

1952 (Tel-Aviv Yafo, IL) -

Life and Times

In 1973 Shamir received a Bachelors of Science in Mathematics from Tel-Aviv University. He received his Master of Science as well as his PhD in Computer Science from the Weizmann Institute of Science 1975 and 1977 . He is currently teaching at Weizmann Institute of Science in the Computer Science and Applied Mathematics Department. He did research at Massachusetts Institute of Technology from 1977 to 1980.

Shamir was awarded, along with Rivest and Adleman, the 2002 ACM Turing Award. He has also received CM's Kannelakis Award, the Erdös Prize of the Israel Mathematical Society, the IEEE's W.R.G. Baker Prize, the UAP Scientific Prize, The Vatican's PIUS XI Gold Medal and the IEEE Koji Kobayashi Computers and Communications Award.

Profesional Contributions

His most important contribution was being a co-inventor of the RSA algorithm. Shamir has also made contributions including the Shamir secret sharing scheme, the breaking of the Merkle-Hellman cryptosystem, and the TWIRL and TWINKLE factoring devices.

Important Publications

Alexander Klimov, Adi Shamir: New Cryptographic Primitives Based on Multiword T-Functions.

Jonathan J. Hoch, Adi Shamir: Fault Analysis of Stream Ciphers

George Stibitz

30 April 1904 (PA, USA) – 31 January 1995 (NH, USA)

Life and Times

George Robert Stibitz graduated in 1926 with a Ph.D in Applied Mathematics from Denison University in Granville Ohio. He received his M.S. degree from Union College in Schenectady, NY in 1927. He worked briefly at the General Electric research labs in Schenectady, before he continued his graduate studies at Cornell University. Stibitz completed his Ph.D. in mathematical physics in 1930 at Cornell. In 1937 Stibitz was an engineer at Bell Labs. From 1941-1945 he served on the National Defense Committee; he worked on important theoretical work dealing with computation. From 1945 to 1954, Stibitz worked as a private consultant in Burlington VT, developing a precursor to the electronic digital minicomputer. He joined the Dartmouth faculty and applied computer systems development to a variety of topics in biomedicine in 1964. In 1966 Stibitz became a Full Professor, and in 1970 he became a Professor Emeritus.

Professional Contributions

George Robert Stibitz held 38 patents, excluding those assigned to Bell labs. “Model K” a breadboard digital calculator could add two bits and display the results. Using only surplus relays, tin-cap strips, flash bulbs, and other canonical items to make his “Model K” – a precursor to the Complex Number Calculator. His great contribution to Computer Science was his creation of the Complex Number Calculator, which first ran in January 8, 1940. This was the world’s first example of remote job entry, a technique that revolutionized dissemination of information through phones and computer networks. The Complex Number Calculator worked on the principle that if two relays were activated, it caused a third relay to be active, which represented the sum of the operation presented by the first two relays. In 1965, he received the Harry Goode Award for lifetime achievement in engineering from AFIPS.

Biographies

Lee, J.A.N. 1995. Computer Pioneers, IEEE Computer Society Press, Los Alamitos CA, 816 pp.

Important works

George Stibitz, "Early Computers," in A History of Computing in the Twentieth Century, *ed. N. Metropolis, J. Howlett, and Gian- Carlo Rota,* New York, 1980

Alan Turing

23 June 1912 (London, GB) – 7 June 1954 (Wilmslow, GB)

Life and Times

Alan Mathison Turing was sent to Hazlehurst Preparatory School where he seemed to be an average good pupil in most subjects, though he turned out to be one of the most brilliant minds of our time. In 1926, Turing went to Sherborne School. In 1931, he entered King's College in Cambridge to study mathematics. Turing graduated in 1934, then in the spring of 1935, he attended Max Neumann's advanced course on the foundations of mathematics. Turing came to America to study at Princeton University, where he received his PhD in 1938.

Turing returned to Britain when the World War erupted. Together with another mathematician named W G Welchman, Turing developed the Bombe, a machine based on earlier work by Polish mathematicians, which decoded all messages sent by the Enigma machines of the Luftwaffe during the war. Turing was awarded the O.B.E. in 1945 for his vital contribution to the war.

Turing also studied neurology and physiology. In 1952, he published the first part of his theoretical study of morphogenesis, the development of pattern and form in living organisms. Turing died of potassium cyanide poisoning while conducting an electrolysis experiments.

Professional Contributions

In his 1936 paper, Turing introduced an abstract machine called a Turing machine, which moved from one state to another using a precise finite set of rules and depending on a single symbol, it adds or deletes from a tape.

In this paper, he proposed the Turing Test, providing the study of information flow with an extremely useful notion which seems to be a significant departure from other current information flow theories. Turing's powerful idea is that information entropy is represented as uncertainty about the mathematical definition of a system, rather than as some function of the direct behavior of the system. The Test is still the test people use today when attempting to answer whether or not a computer can be intelligent. It also defined the theory of computability.

In 1946, Turing received a British government grant to build the ACE, Automatic Computing Engine. The machine's design incorporated advanced programming concepts such as the storing of all instructions in the form of programs in memory without the mechanical setups required for machines such as ENIAC, Electrical Numerical Integrator computer.

Alan Turing's many contributions to computer science were honored by his being elected a Fellow of the British Royal Society in 1951 and by the creation of the prestigious Turing Award by the Association for Computing Machinery, which have been given out every year since 1966 for outstanding contributions to computer science.

Alan Turing spent his final years working at Manchester University. A little known feature of this work was his interest in morphogenesis. This just goes to show that Turing was a great mind that not only had great interest in Mathematics and Computer Science, but Biology as well. He made numerous contributions to the world of Computer Science and it is hard to think of it without the work of Turing included. We wouldn't be here today without him.

Biographies of Famous Computer Scientists

Biographies

Turing, Alan M. Computing Machinery and Intelligence Mind. Vol. 49, 1950.

Hogdes A. Alan Turing: The Enigma. New York: Simon and Schuster, 1983.

Newman, M.H.A. Alan M. Turing, Biographical Memoirs of the Royal Society, 1955

Herken, R. The Universal Turing Machine. 2nd ed. London: Oxford University Press,1988

Important Works

1936 "On Computable Numbers, with an application to the Entscheidungsproblem"

1939 "A Method for the Calculation of the Zeta-Function"

1940 "Turing's Treatise on the Enigma"

1950 "Computing machinery and intelligence in Mind"

1953 'Chess (a subsection of a chapter), Digital Computers Applied to Games, of Faster than Thought"

Mark Wegman

17 November 1949 (Manhattan, NY) –

Life and Times

Mark N. Wegman was born on November 17th, 1949 in Manhattan, NY. His family moved soon after his birth to Brooklyn where he would spend the first five years of his life until his family moved to Freeport in 1954. Here he would spend the next fifteen years of his life before attending NYU in 1969. By 1973 He would attend Berkeley until 1977 but would finish his studies at Westchester while working with IBM. Currently, Mark N. Wegman manages a group at IBM which focuses on possible ways to improve programmer productivity and holds the seat of general chair in POPL 2000 (27th ACM Principles of Programming Languages). He is best known for his involvement in data compression, program optimization and static single assignment analysis for programming languages. However, he has done a lot of with with universal hashing, information retrieval, and programming languages/environments as well. As of today, he is conducting work on a high level language that describes IT needs for business processes.

Professional Contributions

Wegman, along with Victor Miller, discovered a variation of Lempel-Ziv's compression algorithm. As of today, parts of this variation are used in many current sets of standards for GIFs, Unix Compress algorithms, and certain modem standards. Furthermore, Wegman's involvement with Larry Carter and others on universal hashing has most recently produced a fast Java implementation that can be used for cryptography. Universal hashing is the idea of randomly choosing from a list of connections between integers and symbols referred to as hash functions. This randomization provides security because someone watching another's activity could not easily decipher the text being sent. He also did work with static single assignment for programming languages which means that within the compiler every variable is assigned exactly once. He is the general chair of POPL 2000 (Principles of Programming Languages conference) which deals with universal programming principles. As of today, Mark N. Wegman concerns himself with the optimization of programs in hopes of revising how efficient individuals around him are working.

Important Publications

US04814746

US patent no US05826260

Miller, V. S. and Wegman M. N. "Variations on a Theme by Ziv and Lempel" in Combinatorial Algorithms on Words, edited by Z. Galil and A. Apostolico, 1985, Springer-Verlag (Nato ASI series, series F, Vol. 12).

"Universal Classes of Hash Functions", by Carter, J.L., and Wegman, M.N. Journal of Computer and System Sciences vol. 18 no. 2 p.143-54, April 1979.

Cyron, R. Ferrente, J, Rosen, B.K., Wegman, M.N. and Zadeck, F.K., "An Efficient Method of Computing, Static Single Assignment Form," POPL16, Jan 1989, pp.25-35.

Brian Wichmann

1939-

Life and Times

Brian A. Wichmann graduated with a B.S. in mathematics from the University of London. He later graduated with a PhD in group theory from the University of Oxford. He was hired at the National Physical Laboratory in England in 1964, where he has worked for most of his life.

Professional Contributions

Most of Brian's work in computer science deals with validation, standardization, and performance evaluation. He was also one of the original developers of the programming language Ada, which was developed for use by the U.S. Department of Defense during the Cold War. The idea of validation deals with making sure a compiler that is believed to compile a specific language actually compiles that language. Brian is well-known in the computer world for his work on the Pascal Validation Suite, which was used all over the world to check that compilers "conform to the International Standard". In addition to Pascal, he worked on Algol validation and was a key figure in the international standardization of Algol 60, Pascal, Extended Pascal, and Ada. These achievements would be enough to define a career in computer science, but Brian worked on performance evaluation of computers as well. He was the creator of the first synthetic benchmark program, Whetstone. Benchmarks are small programs "weighted" according to statistical information taken from larger programs. These benchmark programs are run to test the relative performance of a computer and its hardware. Whetstone was written in Algol 60 and tested the relative "power" of a computer. Whetstone was later found to be slightly flawed, and Dhrystone was created to take its place. Today, synthetic benchmark programs like Whetstone and Dhrystone are rarely used, as they are not very adept at providing an accurate measure of "real-world performance" of a computer system. They have been replaced in most cases by application benchmarks, such as the SPEC Mark, which seek to provide a better measure of "real-world performance" by running "real-world programs."

Biographies

Who's Who in Science in Europe, A Biographical Guide in Science, Technology, Agriculture, and Medicine, Seventh Edition, Volume 1: United Kingdom, Harlow, England: Longman Group, 1991, p.711.

Important Publications

Brian A. Wichmann, Algol 60 Compilation and Assessment, 1973.

Brian A. Wichmann and Z. J. Ciechanowicz, eds., Pascal Compiler Validation, John Wiley & Sons, Inc., 1983.

David A. Watt, Brian A. Wichmann, and William Findlay, Ada Language and Methodology, Prentice Hall International (UK) Ltd, 1987.

H.J. Curnow and B.A. Wichmann, "A Synthetic Benchmark," The Computer Journal, Vol. 19, No. 1 (1976), pp. 43-49.

Norbert Wiener

26 November 1984 (Columbia, MI) - 18 March 1964 (Stockholm, SE)

Life and Times

Norbert Weiner was put into Peabody school at age 7, but had a problem in choosing which class to enter. Much of Wiener's early education was self taught and he lacked in certain areas. He himself admitted that his chief deficiency was arithmetic. Wiener had a grasp on complex mathematics, but he was not well versed in the manipulation of numbers used in arithmetic. To help his son out, Leo Wiener,a college educated engineer, pulled him out of school and coached him in algebra, so he could develop his logic and broaden his imagination. At age 9 Norbert was put into the equivalent of High School, where he was coached by his teachers, father, and classmates. He graduated at age 11 and went and celebrated with his 18 year old classmates. Norbert actually credits his older friends for helping him through an awkward time and situation.

Wiener graduated from Harvard at age 18 with a PhD in mathematics and went on to work in MIT's Math Department on projects involving communications theory and cybernetics. An interesting fact is that most of his discoveries were based off questions posed to him by colleagues at the MIT labs

Professional Contributions

Norbert Wiener is famous for his work in both communication theory, and fathering the field of cybernetics. While his works are hard to read due to his poor writing style, Wiener strived to make quantitatively measure the meaning of communication so he could apply it to a mechanical system. One of his most noted theories is that communication's meaning represents order; and order that is eternally pitted against entropy (or disorder). His idea was that people are islands of increasing order in a world of increasing entropy. Wiener's theories are based around the idea that we would have to accept that we lived in a world that was going to have a finite end.

Biographies

Wiener, Norbert Ex-Prodigy My Childhood and Youth, (MIT press, june 1964)

Wiener Norbert, I Am a mathematician (MIT Press, June 1964)

Important Works

Wiener, Norbert, The Human Use of Humans (DeCapro Press 1954)

Wiener, Norbert Cybernetics or Control and Communication in the Animal (MIT Press 1965)

Freddie Williams

26 June 1911 (Stockport, GB) – 11 August 1977 (Manchester, GB)

Life and Times

Frederick "Freddie" Calland Williams was educated at The Stockport Grammar school, the University of Manchester and at Magdalen College, Oxford. There he earned his Bachelor of Science in 1932 and his Masters of Science in 1933. In 1939 Williams was recruited by Professor Blackett, to join the Royal Air Force radar research group at Bawdsley research station, In 1946, Williams became the professor of electronics at Manchester. Williams was Knighted in 1976.

Professional Contributions

At Bawdsley, Williams developed the first practical system of radar identification of friendly aircraft. His system was the forerunner of modern systems using intricate codes and carrying radar frequencies. In the early 1940's he perfected the first fully functional automatic radar for use in fighter aircraft. Williams major contribution was the Williams tube What made the tube such an innovation was that it improved the display information on a radar screen. Back then, a standard problem with a radar display was that the static information cluttered the screen. Meaning the land topography would get in the way of the images moving (like the enemy planes), therefore it was harder for the observer to tell moving objects from land. His invention, the Williams tube refreshes the image so that at each refresh the land would be subtracted from the current image, to reveal only the objects that were moving.

Williams later applied and enchanced this idea, then to be known as the Williams-Kilburn tube, to make the memory of the Manchester Mark I.

Important Works

Andrew Yao

24 December 1946 (Shangai, CN) -

Life and Times

Andrew Chi-Chih Yao received his degree in physics in 1967 from National Taiwan University. Yao then travelled to America to get his masters degree and doctorate in physics in 1969 and 1972, respectively. Finally, he completed his formal education at the University of Illinois, getting his doctorate in what he is currently most known for, computer science, in 1975. Andrew Chi-Chih Yao recently became a professor at Tsinghua University in Beijing, China. Prior to that, he had taught at MIT, Stanford University, UC Berkeley, and, directly before to moving back to China, Princeton University.

He received the Turing Award for his "fundamental contributions to the theory of computation, including the complexity-based theory of pseudorandom number generation, cryptography, and communication complexity."

Professional Contributions

Andrew Chi-Chih Yao has primarily dealt with designing efficient algorithms, and has also dealt with theoretical computer science theories, such as the design of quantum algorithms and quantum cryptographic protocols (perhaps due to his extensive background in physics). . Along with that, he is currently interested in seeing how much more efficient algorithms can get. Many of our existing algorithms may be nowhere near perfect in terms of efficiency, and Yao is interested in exploring these possibilities further.

Important Publications

Jakob Ziv

27 November 1931 (Tiberias, IL) -

Life and Times

Jakob Ziv was born in the 1930's in Israel. He studied at Technion, The Israel Institute of Technology. He earned his Bachelor of Science degree in 1954 and his Masters in 1957. After graduating from the Technion his first job was with the Israel Ministry of Defense. There he worked in a communication group and while he had always been interested in communications after reading Goldman's information theory book, he became fascinated with the subject material. From 1959-1962, he studied electrotechnology at the Massachusetts Institute of Technology. In 1962, he earned his PhD from MIT. He began working at Technion, becoming the Dean of the electrotechnical faculty in 1974 and remaining so until 1976. He became the vice president for academic matters in 1978 and until 1982 when he became a selected member of the Israeli academy of the sciences. Currently, he is a distinguished professor at Technion as well as the Herman Gross Professor of Electrical Engineering.

Professional Contributions

What he is most famous for is Lempel-Ziv compression also known as LZ77 and LZ78. In 1977 and 1978 he worked with Abraham Lempel to develop the LZ77 and then the improved LZ78. Ziv developed the concept while Lempel developed the programming algorithm to produce these compression algorithms. Instead of having to repeat text every time it is used one can store the different blocks in a dictionary. When the block of text is reused, you record the block instead of each individual character. This process compresses the transmissions of English text down by fifty-five percent, making it quicker to transmit code. The theory was later developed so that it can apply to compressing pictures as well as music. While LZ77 was not patented, LZ78 was making it not as popular as the previous compression. However, a larger controversy arose when LZW, a compression algorithm designed by Larry Welsh that was based off the LZ78 was given two patents. The first patent was given to Sperry Corporation(US patent 4,464,650), the company Welsh worked for. Later the US granted a patent for the same algorithm to IBM(4,814,746) . Welsh had published the article describing the LZW without revealing that a patent was pending. UNIX used the LZW as an intergral part of their program not knowing it had been patented. It was also used in designing GIF's. Unisys waited many years before eventually announcing that in order to use GIF's one would have to purchase the LZW patent from them creating a "GIF tax."

Important Publications

A. Lempel, J. Ziv, M. Cohn, and W.Eastman, Apparatus and method for compressing data signals and restoring the compressed data signals, US patent 4,464,650, to Sperry Corporation.,Patent and Trademark Office, 1981.

J. Ziv and A. Lempel, A Universal Algorithm for Sequential Date-Compression, IEEE Trans. on Inf. Theory, Vol. IT-23, No. 3, May 1977, pp. 337-343.

Jacob Ziv. The capacity of the general time-discrete channel with finite alphabet. Information and Control, 14(3):233-251, March 1969.

L. Welsh, High speed data compression and decompression apparatus and method, US patent 4,558,302, to Sperry Corporation, Patent and Trademark Office, 1983.

Other Famous Computer Scientists

Priority

These are computer scientists whose biographies will add considerable value to the collection of biographies.

Abrial, Jean-Raymond
Adleman, Leonard M.
Aho, Alfred
Aiken, Howard H.
Al-Khowarizmi, Abu Ja'far
Babaian, Boris A.
Bachman, Charles W.
Bain, Alexander
Bardeen, John
Baran, Paul
Bary, Anita
Basili, Victor “Vic”
Baudot, Emile
Bauer, Fritz
Baugh, C.R.
Bell, Chester Gordon
Bemer, Robert William “Bob”
Blaauw, Gerrit A.
Boyer, Robert S.
Brainerd, John Grist
Bresenham, John “Jack”
Cerf, Vinton
Clarke, James “Jim”
Corbato, Fernando Jose
Cray, Seymour
Crocker, David H.
Curry, Haskell Brooks
Dahl, Ole-Johan
Davies, Donald W.
Denning, Dorothy
Denning, Peter J.
Diffie, Whitfield
Dijkstra, Edsger Wybe
Eckert, Wallace John
Engelbart, Douglas C. “Doug”
Ershov, Andrei P.
Floyd, Robert W.
Fox, Margaret R.
Goldberg, Adele
Goldstine, Herman Heine
Gosling, William “Bill”
Gouraud, Henri
Griswold, Ralph E.
Gruenberger, Fred
Hellman, Martin
Hillis, Danny
Hoare, Charles A.R. “Tony”
Hoff, Marcian E. “Ted”
Holland, John H.
Hollerith, Herman
Hopper, Andrew
Huffman, David A.
Ichbiah, Jean
Iverson, Kenneth E.
Jacquard, Joseph-Marie
Kay, Alan
Kemeny, John G.
Kernighan, Brian W.
Kleene, Steven
Lamport, Leslie
Lampson, Butler W.
Lawrence, Victor B.
Lebedev, Sergei A.
Lempel, Abraham
Licklidder, Joseph C.R.
Liskov, Barbara
McCarthy, John
McCluskey, Edward J.
Mills, Harlan
Milner, Robin
Minsky, Marvin Lee
Moore, Gordon E.
Napier, John
Needham, Roger
Nelson, Theodor “Ted”
Newell, Allen
Newman, Max
Noyce, Robert
Nygaard, Kristen
Parnas, David Lorge
Phong, Biu-Tuong
Pnueli, Amir
Pugh, William
Péter, Rósa
Quinlan, J. Ross
Rivest, Ronald L. "Ron"
Rosenblatt, Frank
Scott, Dana S.
Shaw, Mary
Shell, Donald
Shockley, William Bradford
Shoham, Yoav
Simon, Herbert Alexander
Steele, Guy L., Jr.
Strachey, Christopher
Sutherland, Ivan E.

Tarjan, Robert
Tomlinson, Raymond
Thompson, Kenneth "Ken"
Wang, An
Watson, Thomas John
Welch, Terry
Wijngaarden, Aad van
Wilkes, Maurice V.
Wilkinson, J.H.
Winograd, Terry
Winston, Patrick
Wirth, Niklaus
Yamachita, Hideo
Zuse, Konrad

Desired

These are computer scientists whose biographies we would like to add to the collection.

Boehm, Barry
Booch, Grady
Brattain, Walter H.
Callaway, T.K.
Chen, Peter
Constantine, Larry
Cristian, Flaviu
Date, Christopher J. "Chris"
DeMarco, Thomas "Tom"
Engelberger, Joseph F.
Good, I. J.
Grosch, Herb
Hansen, Per Brinch
Jones, Cliff B.
Josephson, Brian D.
Kapor, Mitch
Mead, Carver
Menabrea, L.F.
Meyer, Bertrand
Michie, Donald
Nagle, John
Olsen, Kenneth Harry
Perrot, Ron H.
Rejewski, Marian
Scheutz, Edvard
Scheutz, Georg Pehr
Schwartz, Randall
Schwartzlander, Earl E.
Sedgewick, Robert
Stroustrup, Bjarne
Sussman, Gerald
Tannenbaum, Andrew S. "Andy"
Tarski, Alfred
Ullman, Jeffrey
Wallace, C.S.
Wallach, Steven J.
Warren, David
Watts, Humphrey S.
Wolfram, Stephen
Yourdon, Edward "Ed"

Unevaluated

These are names of people who have not been evaluated for whether their biographies belong in this collection.

Andrews, Earnest Galen
Arbib
Armstrong, William W.
Artybasheff, Boris
Arvind
Atkinson, Bill
Auerbach, Isaac Levin
Baran
Barron, Ian
Barth, Carl George Lange
Bartik, Jean
Baum, Lyman Frank
Bayes
Bech, Niels
Beck, Kent
Berstein, Arthur
Bigelow, Julian
Billings, John Shaw
Bjerknes, Vilhelm
Blum, Manuel
Blumenthal, William Michael
Bollee, Leon
Boyce, Raymond
Boyer, Joseph
Bradley, David J.
Brattain, Alexander
Braun, Antonius
Braun, Ferdinand
Bricklin, Daniel
Brody, Florian T.
Brown, Gordon S.
Brown, Theodore
Brown, Thomas
Bryce, James Wares
Buerghi, Joseph
Burks, Alice

Burks, Arthur Walter
Burroughs, William Seward
Bushnell, Allen
Bushnell, Nolan
Caminer, David
Canny, John
Carr, John Weber
Cary, Frank Taylor
Casselli, Giovanni
Charney, Jule Gregory
Checkland
Chevion, Dov
Christen, Ward
Chu, Peter
Clarke, Edith
Cohen, Gerald
Colmar, Thomas de
Comrie, Leslie John
Coombs, Allen W. M.
Curtiss, John Hamilton
Dantzig, George Bernard
David, Harson
Davis, Martin
Deeds, Edward Andrew
Dennis, John "Jack"
Dick, Alfred Blake
Diebold, John
Duff, Tom
Ed, Rob
Eich, Brendan
Ellis, Jim
Ellison, Lawrence "Larry"
Engel, Jr., Frank August
Estridge, Don
Evans, Robert Overton
Everett, Robert Rivers
Fairchild, George Winthrop
Fano, Robert Mano
Fantl, Leo
Fast, August
Felt, Dorr Eugene
Fischer, Emst Georg
Flanders, Donald Alexander
Flemming, John Ambrose
Flint, Charles Ranlett
Flowers, Thomas "Tommy"
Forest, Lee de
Forrester, Jay Wright
Forster, James Franklin
Forsythe, Alexandra Illmer
Frank, Werner
Frankston, Bob
Frege, G.
Freytag Löringhoff, Bruno von
Friedman, William Frederick
Fylstra, Dan
Galler, Bernard Aaron
Galvin
Gardner, Martin
Gates, Jim
Geissler Igelshieb, Heinrich
Georgio, Levi
Geschke, Charles M.
Gill, Stanley
Gittens, Maurice
Glushkov, Victor Mikhaylovich
Goetz, Marty
Good, Donald I.
Goodman, Richard
Gore, John K.
Goto, Eiichi
Grad, Bur
Grant, George Barnard
Granville, Evelyn Boyd
Gray, James
Green, John
Green, Julien
Gries, David
Grillet, Rene
Grove, Andrew
Groves, Leslie Richard
Gudden, John Bernard
Haberman
Harron, Ducos de
Hartree, Douglas Rayner
Hazen, Harold Locke
Henry, Joseph
Herbrand, Jacques
Herschel, John
Herz, Heinrich
Hewlett, William R.
Hill, Richard
Hoerni, Jean
Holberton, Betty
Holland, John
Holt, Ray
Hooper, Edith
Hoover, Erna Schneider
Hough, Paul
Househoulder, Alston Scott
Hull, Clark
Hurd, Cuthbert C.
Huskey, Harry Douglas
Hyatt, Gilbert
Irvine, John
Iwatani, Toru
Jacobs, Walter W.
Jaquet-Droz, Pierre en Henry
Jennings, Nicholas
Jevons, William Stanley
Johnson, Reynold B.
Jones, Fletcher
Jones, Kirk
Juris Hartmanis
Kahan, William (Velvel)
Karp, Richard M.
Katz, Charles
Katz, Philip
Kempelen, Wolfgang von
Kildall, Gary

Biographies of Famous Computer Scientists

Kinsberger, Jack van
Lake, Clair D.
Langton, Christopher
Lawrence, Victor B.
Lazowska, Ed
Lecht, Charles
Lehman, Manny
Lehmer, Derrick Henry
Lehovec, Kurt
Leibniz, Gottfried
Lenat, Doug
Levin, Leonid
Lovasz
Ludgate, Percy E.
Lukoff, Herman
Lull, Ramon
Machover, Carl
Mandelbrot, Benoit
Mannhein, Amedee
Marquand, Allan
Matthaeus, Philip
McCulloch, Warren
Meagher, Ralph Ernest
Metropolis, Nicholas C.
Millard, William
Mock, Owen
Moers, Calvin
Molnar, Charles E.
Moore, J. Strother
Morland, Samuel
Morris, James
Muller, Joseph
Negroponte, Nicholas
Nevanlinna
Newman, M.A.H.
Nie, Norman
Nielsen
Norris, William
Ocagne, Maurice d'
Odhner, Willgodt Theophil
Opel, John R.
Oughtred, William
Pasta, John R.
Pastore, Annibale
Paterson, Timothy "Tim"
Patrick, Bob
Patterson, John Henry
Peddle, Chuck
Pickette, Wayne D.
Pinkerton, John
Pitts, Walter
Poel, William Louis van der
Porter, Andrew
Postley, John
Pratt, Vaughn
Prewitt, Judy
Pugh, Emerson W.
Putnam, Hilary
Putzolo, Frank
Rabin, Michael O.
Raghavan
Rajchman, John
Ramo, Simon
Rand, James Henry
Randell, Brian
Rees, Mina Spiegel
Reynolds, John
Ridenour, Louis
Riese, A.
Rock, Arthur
Rosen, Saul
Ross, Douglas
Rosza, Peter
Sammet, Jean
Schank, Roger
Schickard, Wilhelm
Schneiderman
Schott, Gaspard
Schrayer, Michael
Schreyer, Helmut
Schroder, Michael
Selfridge
Shaw, Cliff J.
Shaw, John
Simpson
Slutz, Ralph J.
Smith, Burton
Soloway, Elliot
Stallman, Richard
Stanhope, Charles 3rd earl of
Stearns, Richard E.
Stonebraker, Michael
Svoboda, Antonin
Teal, Gordon
Thrun, S.
Tompson, Joseph John
Toriano, Gianello
Torres y Quevedo, Leonardo
Tramiel, Jack
Trevisa
Treybig, Jimmy
Tukey
Turner, David
Ulam, Stanley M.
Uncapher, Keith
Utman, Richard
Verea, Ramon
Viehe, F.W.
Ware, Willis Howard
Warnock, John E.
Weener, Peter
Wegstein, Joseph "Joe"
Weinberger, Peter
Weiser, Mark
Weizenbaum, Joseph
Wheeler, David John
Wiberg, Martin
Widgerson, Avi
Wijngaarden, Arie van
Williams, Hugh

Winters, Joan Margaret
Wolf, Wayne
Woodger, Michael
Wooldridge, Dean Everett
Wooley, B.A.
Zadeh
Zemanek, Heinz
Zhong, Hong-Jiang
Zygalski, Henryk

Inventors and Celebrities

The following are people who are not computer scientists by our definition, but whose biographies are wanted for the Inventors and Celebrities section.

Allen, Paul
Andreessen, Marc
Ballmer, Steve
Gates, William "Bill"
Jobs, Steven Paul
Packard, David
Sculley, John
Sinclair, Clive
Torvalds, Linus
Wozniak, Stephen

Style Information

The objective of this collection of biographies is two-fold. It provides an opportunity to have students in Introduction to Computer Science classes to do library research and writing. It also provides students of computer science with a compact reference to the significant figures in computer science.

Each biography is therefore constrained in a number of ways. The biographies must be severely limited in most cases, providing only the most important information. In particular, bibliographies of the individuals works are very selected. The list of biographies provide further information on each individual.

The name used as a title is the most common complete name (given and family name) used. The first mention of the name in the biography is their full legal name. Each occurrence thereafter is the most common way of referring the the subject, usually their given name but sometimes their family name.

The date of birth and death are in the punctuation free format preferred by the Style Guide. Place of birth and death are the nearest reasonable place. In the US, the standard abbreviations are used for the state, and the country is omitted. In other countries the ISO standard country code is used.

The separation of "Professional Contributions" and "Life and Times" is in many cases artificial, but hopefully allows the reader to scan the information more easily. The list of biographies provides sources of further information for the interested reader.

Education is always described in the Life and Times, along with important changes of employer, and features of their lives that may be interesting or inspiring to students.

Professional contributions describes the body of knowledge and concepts contributed by that individual to the field of computer science. It also lists the awards the subject has received (usually only those for Computer Science work).

Where the subject's work is related to other subjects in this collection, the other subjects are listed in the "See Also" section.

The "Important Publications" section is formatted according to the standards of IEEE Transactions journals. This is essentially the Chicago style.

The ACM Alan Mathison Turing Award "It is given to an individual selected for contributions of a technical nature made to the computing community. The contributions should be of lasting and major technical importance to the computer field."

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